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ABSTRACT

In many states technology standards for students have focused on basic computer skills, but more standards are beginning to focus on identifying technology skills that students need for school and the workplace. In most states in the Southern Region, technology standards for students are based on the National Educational Technology Standards for Students (NETS-S) Technology Foundations for Students, a broad conceptual framework of technology knowledge developed by the International Society for Technology in Education (ISTE). These standards given teachers and schools a framework for planning technology-based activities that not only support instruction but also improve students' technology skills. The standards cover six categories: basic operations and concepts; social, ethical and human issues of technology; common productivity tools; technology communications tools; technology research tools; and problem-solving and decision-making skills aided by technology. Each category describes what students should know and be able to do at each grade level. Even though most of them are based on the NETS-S standards, student technology standards in Southern states vary somewhat. This publication identifies what the following states are doing to set standards: Alabama, Arkansas, Delaware, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. States across the region recognize the importance of curriculum standards to ensure that students have the necessary academic and technological skills to continue to learn and succeed, whether in higher education or careers. (AEF)

Technology Standards for Students

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Technology Standards for Students

SREB

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How should students be able to use technology? Should technology standards be described separately from core content or be incorporated into it? Is technology a separate subject or a tool to support other subjects? How can we assess students' proficiency in using technology? School districts, state boards of education and legislatures in Southern states are asking these questions.

Many schoolchildren already know more about technology than do their teachers and parents. Others, however, may be exposed to computers and the Internet only in school. Therefore, setting technology standards and designing ways to assess all students' technological competency are difficult. In many states technology standards for students have focused on basic computer skills, but more standards are beginning to focus on identifying technology skills that students need for school and the workplace.

In most states in the region, technology standards for students are based on the National Educational Technology Standards for Students (NETS•S) Technology Foundations for Students, a broad conceptual framework of technology knowledge developed by the International Society for Technology in Education (ISTE). These standards give teachers and schools a framework for planning technology-based activities that not only support instruction but also improve students' technology skills. The standards cover six categories: basic operations and concepts; social, ethical and human issues of technology; common productivity tools; technology communications tools; technology research tools; and problem-solving and decision-making skills aided by technology. Each category describes what students should know and be able to do at each grade level.

Even though most of them are based on the NETS•S standards, student technology standards in Southern states vary somewhat. Some identify highly specific skills — such as proficiency using word processing software — to be mastered. Others describe general skills that are integrated into

NETS•S Technology Foundations for Students:

- Basic operations and concepts
- Social, ethical and human issues
- Technology productivity tools
- Technology communications tools
- Technology research tools
- Technology problem-solving and decision-making tools

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states' academic requirements with the expectation that students will become proficient at using technology by using it in academic courses. Delaware, Maryland, South Carolina, Tennessee and Texas require students to take courses in technology before they graduate from high school. Alabama, Mississippi and North Carolina require technology courses only for students who fail a computer skills test or cannot use technology proficiently by high school.

What states are doing to set standards

In ***Alabama,*** technology use should be an integral part of K-12 education. Students must demonstrate that they are computer-literate before high school graduation; local school systems determine competencies and assessment methods. Alabama students who fail a computer skills test must complete a computer applications course that addresses specific skills: computer basics (including issues and ethics of computer use, copyright, appropriate use and security), word processing, databases, spreadsheets and telecommunications.

One of ***Arkansas'*** educational goals is that "all students ... will demonstrate proficiency in technology standards." Arkansas' state technology plan, adopted in June 2000, includes technology competencies for students and teachers. Teachers can use these competencies, which are based on the NETS•S standards, in planning technology-rich activities. Technology skills are expected to be incorporated into the state's academic curriculum rather than taught separately.

Students in ***Delaware*** are expected to become computer-literate through formal classes or related coursework. One unit of a computer skills course is required for graduation. Technology standards also are incorporated throughout curriculum standards.

Each content area of ***Florida's*** Sunshine State Standards for Students incorporates student use of technology. For example, standards for language arts in high school include the expectation that a student "effectively integrates multimedia and technology into presentations." Students in seventh-grade mathematics are expected to "use technology ... to analyze data and create graphs." However, one goal of Florida's technology plan, which is under development, is that "standards will be established for students, educators and instructional support staff that will identify the technology competencies they should possess." This goal may require amending the Sunshine State Standards to have formal standards for student use of technology.

Both vocational and college-preparatory students in ***Georgia*** are required to complete one unit of computer technology for high school graduation. In September 2000 the state Board of Education approved a plan to integrate technology standards throughout the Quality Core Curriculum; the form and content of those standards are under development.

Profile for Arkansas' Technology Literate Students, Grades 6-8

Prior to completion of grade 8, Arkansas students will:

- apply strategies for identifying and solving routine hardware and software problems that occur during everyday use;
- demonstrate knowledge of current changes in information technologies and the effect those changes have on the workplace and society;
- exhibit legal and ethical behaviors when using information and technology and discuss consequences of misuse;
- use content-specific tools, software and simulations to support learning and research;
- apply productivity/multimedia tools and peripherals to support personal productivity, group collaboration and learning throughout the curriculum;
- design, develop, publish and present products using technology resources that demonstrate and communicate curriculum concepts to audiences inside and outside the classroom;
- collaborate with peers, experts and others using telecommunications and collaborative tools to investigate curriculum-related problems, issues and information and to develop solutions or products for audiences inside and outside the classroom;
- select and use appropriate tools and technology resources to accomplish a variety of tasks and solve problems;
- demonstrate an understanding of concepts underlying hardware, software and connectivity and of practical applications to learning and problem-solving; and
- research and evaluate the accuracy, relevance, appropriateness, comprehensiveness and bias of electronic information sources concerning real-world problems.

Kentucky is taking a long-term approach regarding standards. Technology use is being incorporated into all curriculum guidelines for each subject area and at each grade level. Kentucky uses the National Educational Technology Standards for Students (NETS•S) as the basis for these guidelines. Kentucky's new set of student competencies in technology should be completed by spring 2001 and will be incorporated into the state's Core Content and Program for Studies.

The *Louisiana* State Educational Technology Guidelines are based on the National Educational Technology Standards for Students and the Louisiana State Content Standards. These technology standards support the state's goal that "all educators and learners will have access to technologies that are effective in improving student achievement." The State Educational Technology Guidelines parallel the Louisiana Content Standards' descriptions of what students should know and be able to do. The technology guidelines promote the development of students who use technology and information responsibly to create quality products and to be productive citizens. The focus is on learning *with* information and technology rather than on learning *about* technology. Schools and districts will enact these guidelines differently, based on the diverse needs of their student populations

Louisiana K-12 State Educational Technology Guidelines encompass:

- Technology communications tools
- Technology problem-solving and decision-making tools
- Technology productivity tools
- Technology research tools
- Social, ethical and human issues
- Basic operations and concepts

The newly adopted *Maryland* State Content Standards Learning Outcomes for students in science, mathematics, English language arts and social studies include technology-related indicators. For example, Maryland students should be able to "prepare writing for publication using electronic resources (e.g., word processing, database, spreadsheet software) to adopt an appropriate format and principles of design (e.g., headings, margins, spacing, columns, page orientation) that enhance the final product" by the end of eighth grade. The Maryland State Content Standards for science say that students should be able to use "computers and/or graphing calculators to produce visual materials (tables, graphs and spreadsheets) that will be used for communicating results." The State Department of Education is drafting a document that will highlight the technology standards that are embedded in subject areas.

Students in *Mississippi* either must pass a computer skills test or take computer education and keyboarding before they graduate from high school. Students are expected to have a working knowledge of technology-based tools; use technology and information responsibly by understanding their impact on society; select and use appropriate technology-based tools to support learning; use technology to communicate effectively; and use technology to identify, explore and solve problems and to make quality decisions.

Students in *North Carolina* must pass the North Carolina Test of Computer Skills before high school graduation. This test, which initially is given to eighth-graders, is intended to help ensure that students have sufficient technology skills when they enter high school. Eighth-graders who fail the test have the opportunity to meet the requirements during high school, but no specific technology or computer course is required. In addition to the K-12 computer skills curriculum that supports the North Carolina Test of Computer Skills, the state has preliminary standards for infusing technology into elementary school language arts and mathematics; for integrating technology for communication and research in middle school and providing remedial assistance to students who need extra help with basic skills; and for implementing technology in all areas — research and communication, mathematics, science and vocational/technical education — in high school.

North Carolina Computer Technology Skills Curriculum competency goals

- The learner will understand important issues of a technology-based society and will exhibit ethical behavior in the use of computers and other technologies.
- The learner will demonstrate knowledge and skills in the use of computers and other technologies.
- The learner will use a variety of technologies to access, analyze, interpret, synthesize, apply and communicate information.

All *Oklahoma* students — regardless of educational or career goals — must know how to use instructional technology. The Priority Academic Student Skills (PASS) standards adopted by the Oklahoma School Board are intended to encourage the use of technology throughout the curriculum, and sections on integrated curricula focus on information literacy and instructional technology. The basic skills for instructional technology statewide purposely are defined broadly. High school students are encouraged to take computer science courses as part of their college-preparatory course of study, and graduates of public colleges and universities have been required since 1998 to demonstrate mastery of computer skills.

Effective with the Class of 2001, *South Carolina* high school students must take one unit of computer science in order to graduate. Technology is incorporated throughout the curriculum, with specific age-appropriate results at grades five and eight.

South Carolina Technology Standards:

- The student will demonstrate basic understanding of computer theory, including bits, bytes and binary logic.
- The student will develop basic technology skills.
- The student will process, store, retrieve and transmit electronic information.
- The student will communicate through application software.

In 1999 the *Tennessee* Board of Education approved technology literacy and usage standards based on ISTE's National Educational Technology Standards for Students. Before he or she graduates from high school, every student is expected to demonstrate proficiency with computers — learned either in earlier grades or from a basic course in personal computing in high school. For each standard there are grade-level performance indicators and sample tasks. Teachers will assess — using tests when appropriate — students' performance on technology-related tasks and how they use technology in subject areas. For example, all students "will use technology as a tool to conduct and evaluate research and to communicate effectively information and ideas." A first-grader would meet this standard by using developmentally appropriate technology or vocabulary to respond to a specific question or

Tennessee Computer Technology — Standards for Literacy and Usage

- The student will explore the history of technology in our society.
- The student will analyze the social impact of and explore ethical issues of technology usage.
- The student will develop a vocabulary to communicate effectively in a technological society.
- The student will demonstrate proficiency in the care and use of computer-based technology.
- The student will use a variety of technologies to improve classroom learning, increase productivity and support creativity.
- The student will use technology as a tool to conduct and evaluate research and to communicate effectively information and ideas.
- The student will use technology resources to develop problem-solving strategies, improve decision-making and support real-world applications.

to collect information about a topic. A seventh-grader would meet the standard by developing a multimedia presentation that shows how he or she collected, analyzed and presented findings of some research.

Texas requires a technology curriculum for grades K-12 to provide opportunities for students to learn technology skills and the use of computers and related electronic tools. Starting in September 1998, all Texas schools were required to implement this enrichment curriculum, which teachers use as a guideline in planning instruction. Technology applications are included in the Texas Essential Knowledge and Skills standards for students in elementary, middle and high school. All students who began high school in the 1998-99 school year must complete a technology applications unit before graduation.

Virginia has incorporated technology standards for students throughout its Standards of Learning for Virginia Public Schools. "Computer and technology skills are essential components of every student's education. In order to maximize opportunities for students to acquire necessary skills for academic success, the teaching of these skills should be the shared responsibility of teachers of all disciplines." Minimum computer-technology skills — as they relate to students' schoolwork — are assessed in fifth and eighth grades. For example, by the end of eighth grade students should be able to use spreadsheets in collecting and analyzing data and to create charts and graphs that convey mathematical information. They also should be able to write and edit multipage documents using word processing software and to develop documents that contain hyperlinks for language arts courses.

West Virginia's Board Policy states that "technology must be interwoven with educational improvements and reform to accomplish educational goals, increase student achievement and provide increased opportunities for lifelong learning." The policy also requires that all high school graduates be proficient in the basic uses of computers and that computer and technology skills be taught and utilized throughout all programs of study, particularly in the areas of career awareness, career exploration, work-based learning and information about postsecondary education. Each graduate receives a certificate of proficiency that describes the computer instruction he or she received.

Effective technology standards are included in core curricula

States across the region recognize the importance of curriculum standards to ensure that students have the necessary academic and technological skills to continue to learn and succeed, whether in higher education or careers. While technology standards are important, it is equally important that these standards relate to other academic requirements. Some states have adopted ISTE's National Educational Technology Standards for Students, but ISTE recommends that states use those standards as a basis for developing standards that adequately reflect state needs. Technology standards for students that are included in the state's curriculum guidelines and that support the core curriculum can be more effective

than those seen as an additional academic requirement. Standards should reflect the conviction that technology is best understood and taught in realistic, integrated settings throughout the curriculum. To utilize fully the resources of the classroom, school and community, guidelines for technology use and standards for student performance using technology should be integrated into all aspects of the curriculum — not taught in isolation.

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